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(54) **MULTILAYERED POLYESTER SHEET**

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a multilayered polyester sheet capable of being thermally fused at practical temp. of about 110-150°C in spite of its high heat resistance.
SOLUTION: This multilayered polyester sheet is obtained by laminating two or more sheets and at least one layer is constituted of a sheet A composed of a resin compsn. consisting of polyester (A-1) composed of a glycol unit based on dicarboxylic acid unit based on a terephthalic acid unit and ethylene glycol unit (I) and a glycol unit based on 1,4-cyclohexanedimethanol unit (II) and characterized by that a mol ratio (I)/(II) of the

ethylene glycol unit (I) and a 1,4- cyclohexanedimethanol unit (II) is 1 or more and aromatic polycarbonate (A-2).

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CLAIMS

[Claim(s)]

[Claim 1] It is the multilayer sheet which comes to carry out the laminating of the sheet of two or more sheets. At least one of them It is polyester which consists of a glycol unit which is mainly concerned with dicarboxylic acid unit [which is mainly concerned with a terephthalic-acid unit], ethylene glycol unit (I) and 1, and 4-cyclohexane dimethanol unit (II). (A-1) And the polyester whose mole-ratio (I)/(II) of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) is one or more, And (A-2) the multilayer polyester sheet characterized by being the sheet A which consists of a resin constituent which consists of an aromatic series polycarbonate.

[Claim 2] The multilayer polyester sheet according to claim 1 which is that in which a multilayer polyester sheet contains amorphism polyester sheet layers other than a sheet A horizon and a sheet A horizon.

[Claim 3] The multilayer polyester sheet according to claim 1 or 2 characterized by taking the decentralized structure from which a component (A-1) serves as a continuous phase in the resin constituent which constitutes Sheet A.

[Claim 4] The multilayer polyester sheet according to claim 1 or 2 characterized by taking the decentralized structure from which a component (A-2) serves as a continuous phase in the resin constituent which constitutes Sheet A.

[Claim 5] Claims 1-4 characterized by a multilayer polyester sheet being an object for cards are the multilayer polyester sheets of a publication either.

[Claim 6] The card which consists of a multilayer polyester sheet according to claim 5.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] Although this invention has high thermal resistance, it relates to the multilayer polyester sheet which can carry out thermal melting arrival at the practical temperature of about 110-150 degrees C.
[0002]
[Description of the Prior Art] 1 and 4-cyclohexane dimethanol derivative copolymerized polyester is the polymer of amorphism nature, and transparency, chemical resistance, and its shock resistance are good, and it is widely used for food packing, building materials, etc. as an extrusion sheet. Since glass transition temperature is about 80 degrees C, in case 1 and 4-cyclohexane dimethanol derivative copolymerized polyester is processed into a multilayer sheet, it can carry out thermal melting arrival at the low temperature of about 110-120 degrees C, and has the features of excelling also in workability. However, it was not able to use for an application as which a high heatproof is required. The approach of blending the polymer which has high glass transition temperature in 1 and 4-cyclohexane dimethanol derivative copolymerized polyester as one of the approaches of raising the thermal resistance of the sheet which consists of 1 and 4-cyclohexane dimethanol derivative copolymerized polyester is one of the approaches considered from the former.
[0003] A blend object and a sheet with the polyester (Pori (1, 4-cyclohexane-dimethanol-terephthalate-KO-isophthalate) is called below) which consists of a glycol unit which is mainly concerned with a polycarbonate, the dicarboxylic acid unit which is mainly concerned with a terephthalic-acid unit and an isophthalic acid unit, and 1 and 4-cyclohexane dimethanol unit to JP,53-94536,A are shown. This blend object holds the transparency which is nothing, a polycarbonate, and the description of Pori (1, 4-cyclohexane-dimethanol-terephthalate-KO-isophthalate) about a compatible system over the large range. If a polycarbonate, and the blend object and the sheet with Pori (1, 4-cyclohexane-dimethanol-terephthalate-KO-isophthalate) increase the content of a polycarbonate, surely thermal resistance will improve. However, when it was going to raise thermal resistance, thermal melting arrival temperature was not able to rise, either, and it was not able to have high thermal resistance and easy-workability.
[0004] On the other hand, although the multilayer sheet made of rigid-polyvinyl-chloride resin was generally used for the credit card and the banking card, since polyvinyl chloride resin was inferior to thermal resistance, the multilayer sheet which may deform it if leaving it all over the automobile of midsummer etc. is exposed to the bottom of an elevated temperature, and was excellent in thermal resistance was demanded.
[0005]
[Problem(s) to be Solved by the Invention] Let it be a technical problem to have easy-workability, like thermal melting arrival can be carried out at the practical temperature of about 110-150 degrees C, although this invention has high thermal resistance, and to

offer a multilayer polyester sheet also with a good mechanical characteristic.
[0006]
[Means for Solving the Problem] Namely, this invention is a multilayer sheet which comes to carry out the laminating of the sheet beyond (1) 2 sheet. It is polyester which consists of a glycol unit in which at least one of them is mainly concerned with dicarboxylic acid unit [which is mainly concerned with a terephthalic-acid (A-1) unit], ethylene glycol unit (I) and 1, and 4-cyclohexane dimethanol unit (II). And the polyester whose mole-ratio (I)/(II) of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) is one or more, And (A-2) the multilayer polyester sheet characterized by being the sheet A which consists of a resin constituent which consists of an aromatic series polycarbonate, (2) In the resin constituent which constitutes the multilayer polyester sheet of the above-mentioned (1) publication which is that in which a multilayer polyester sheet contains amorphism polyester sheet layers other than a sheet A horizon and a sheet A horizon, and the (3) sheet A In the resin constituent which constitutes a multilayer polyester sheet the above (1) characterized by taking the decentralized structure from which a component serves as a continuous phase, or given in (2), and the (4) sheet A (A-1) The above (1) characterized by taking the decentralized structure from which a component serves as a continuous phase, or a multilayer polyester sheet given in (2), (A-2) (5) It is the card which consists of a multilayer polyester sheet the multilayer polyester sheet of any of - (4), or **, and given in (1) (6) above-mentioned [above-mentioned] (5) characterized by a multilayer polyester sheet being an object for cards.
[0007]
[Embodiment of the Invention] Even if this invention is a multilayer polyester sheet whose at least one of them it is the multilayer sheet which comes to carry out the laminating of the sheet of two or more sheets, and is the sheet A which consists of the following (A-1) resin constituent and is a multilayer sheet with which all consist of a sheet A, it may be a multilayer sheet some of whose layers are Sheets A.
[0008] The component (A-1) which constitutes the sheet A of this invention is polyester which consists of a glycol unit which is mainly concerned with dicarboxylic acid unit [which is mainly concerned with a terephthalic-acid unit], ethylene glycol unit (I) and 1, and 4-cyclohexane dimethanol unit (II), and is polyester whose mole-ratio (I)/(II) of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) is one or more.
[0009] (A-1) Mole-ratio (I)/(II) of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) is 90 / 10 - 60/40 among a glycol component, and (I)/(II) is 75 / 25 - 65/35 more preferably, and, as for the desirable thing of 1 and 4-cyclohexane dimethanol derivative copolymerized polyester used as a component, an acid component consists of a terephthalic acid. Although it generally mixes with this desirable 1 and 4-cyclohexane dimethanol derivative copolymerized polyester with a polycarbonate, they have two kinds of glass transition temperature, and are nothing and translucent in 2 phase system. Even if mole-ratio (I)/(II) of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) uses polyester smaller than 1 instead of the above-mentioned (A-1) component, in order to dissolve with a polycarbonate generally and to form a monolayer, if it is going to raise thermal resistance, thermal melting arrival temperature will also rise, and it becomes difficult to consider as the sheet having high thermal resistance and easy-workability.

[0010] Although especially the manufacture approach of 1 and 4-cyclohexane dimethanol derivative copolymerized polyester used as a component (A-1) in this invention is not limited, the method of carrying out the polycondensation of a terephthalic acid or its low-grade alkyl ester, 1 and 4-cyclohexane dimethanol, and the ethylene glycol, and obtaining them under existence of the catalyst of an organic titanium compound etc. or nonexistence, is mentioned, for example. As polymerization conditions, the conditions indicated by U.S. Pat. No. 2,901,466, for example may be applied.
[0011] To 1 and 4-cyclohexane dimethanol derivative copolymerized polyester used as a component (A-1) in this invention It is the range not more than 10 mol % preferably. the range which does not spoil the effectiveness of this invention -- usually -- less than [20 mol %] -- As an acid component, isophthalic acid, an alt.phthalic acid, 2, 6-naphthalene dicarboxylic acid, 2, 7-naphthalene dicarboxylic acid, 1, 5-naphthalene dicarboxylic acid, - biphenyl dicarboxylic acid, and methyl terephthalic-acid, 4, and 4 '2, 2'-biphenyl dicarboxylic acid, 1, 2'-bis(4-carboxy phenoxy)-ethane, a succinic acid, As other dicarboxylic acid, such as adipic-acid, suberic-acid, azelaic-acid, sebacic-acid, dodecane dione acid, OKUTA decane dicarboxylic acid, dimer acid and 1, and 4-cyclohexane dicarboxylic acid, and a glycol component Propylene glycol, 1,5-pentanediol, 1,6-hexanediol, 1, 8-octanediol, 1, 10-Deccan diol, 1, 3-cyclohexane dimethanol, What copolymerized other glycols, such as a 1, 2-cyclohexane dimethanol and 2, and 2-bis(2'-hydroxy ethoxy phenyl) propane, can be used.
[0012] The polycarbonate used as a component (A-2) in this invention has that desirable by which what uses as the main raw material one or more sorts chosen from - dihydroxy diphenylsulfone, and - bis(4-hydroxyphenyl) propane (bisphenol A), and 2 and 2 '4, 4'-dihydroxydiphenyl alkane or 4, and 4 '4, 4'-dihydroxy diphenyl ether is preferably mentioned, and is manufactured considering bisphenol A as a main raw material especially. Specifically, the polycarbonate obtained by the ester interchange method or the phosgene method, using above-mentioned bisphenol A etc. as a dihydroxy component is desirable. Furthermore, a part of bisphenol A and the thing which permuted less than [10 mol %] preferably with - dihydroxy diphenylsulfone, and 4 and 4'-dihydroxydiphenyl alkane or 4, and 4 '4, 4'-dihydroxy diphenyl ether etc. are also desirable.
[0013] Furthermore, the resin constituent which constitutes Sheet A in this invention can have high thermal resistance and easy-workability, when taking a decentralized structure from which a component (A-1) serves as a continuous phase, or when taking the decentralized structure from which a component (A-2) serves as a continuous phase. the case where a component (A-2) exists as a dispersed phase as this decentralized structure in the continuous phase which consists of a component (A-1), and a component (A-1) and a component (A-2) -- any -- although -- when forming a continuous phase, the case where a component (A-1) exists as a dispersed phase in the continuous phase which consists of a component (A-2) etc. is mentioned. A decentralized structure means the case where a certain polyphase structure which is not a single phase is formed here.
[0014] As for the presentation ratio of the resin constituent which constitutes the sheet A in this case, it is desirable that they are 10 % of the weight - 90 % of the weight (A-1) of components and 90 % of the weight - 10 % of the weight (A-2) of components to the sum total of a component (A-1) and a component (A-2). In this range, the multilayer polyester sheet which combines the outstanding thermal resistance and easy-workability can be

obtained. Thermal melting arrival can be carried out at the low temperature of 110-130 degrees C that a component (A-1) tends [especially] to form a continuous phase 50% of the weight or more as they are 90 or less % of the weight (A-1) of components, and 10 % of the weight or more of 50 or less % of the weight components (A-2). Moreover, in spite of having less than 50 % of the weight (A-1) of ten or more components, 50 % of the weight of 90 or less % of the weight component (A-2) super-******, and the thermal resistance that a component (A-2) tended to form a continuous phase, and was excellent, thermal melting arrival can be carried out at the practical temperature of 130-150 degrees C.

[0015] In this invention, there is no approach of blending a component (A-1) and a component (A-2), and it can perform especially definition by the well-known approach. The approach of carrying out melting kneading is mentioned to homogeneity, using a monopodium or a twin screw extruder as the concrete manufacture approach. As for the approach of processing it into a sheet, the approach that a T-die method, a tubular film process, a press-forming method, etc. are well-known is used.

[0016] In this invention, there is especially no limit in the construction material of the sheet used in case the laminating of the sheets other than Sheet A is carried out, and the construction material of paper, cloth, synthetic resin (for example, polyolefin resin, polyamide resin, polyimide resin, polyester resin, polyvinyl chloride resin, a polyvinyl chloride / vinyl acetate copolymerization resin, ABS plastics, etc.), etc. can be used. Between each class, an adhesives layer may be prepared if needed. Furthermore, you may print on each class and the magnetic substance may be applied. This magnetic layer may be the whole sheet surface, or may be some sheets, such as the shape of a stripe.

[0017] Although the approaches of common knowledge of arbitration, such as the co-extruding method, and a heating laminated layers method, the hot melt method, are used according to the construction material of sheets other than Sheet A, when using a heating laminated layers method, the laminating approach of the multilayer polyester sheet of this invention has the desirable sheet of the construction material in which thermal melting arrival is possible in 110-150 degrees C, and it is desirable to use an amorphism polyester sheet as this sheet.

[0018] As amorphism polyester here, the polyester whose amount of heat of crystallization when lowering the temperature the rate for 10-degree-C/from a melting condition with a differential scanning calorimeter is 5 or less cal/g is usually mentioned.

[0019] The sheet which consists of a constituent containing an amorphism polyester independent or amorphism polyester as an amorphism polyester sheet which carries out a laminating is mentioned, and amorphism polyethylene terephthalate, polyethylene terephthalate copolymer, 1, and 4-cyclohexane dimethanol derivative copolymerized polyester etc. is mentioned as amorphism polyester. The amorphism polymer of further others can be blended and used for this amorphism polyester, an aromatic series polycarbonate, amorphism polyester, etc. are mentioned as this amorphism polymer, and an aromatic series polycarbonate is desirable also in it. The amount of amorphism polymers to blend has 10 - 90 desirable % of the weight.

[0020] Moreover, the laminating gestalt of the multilayer polyester sheet of this invention comes to carry out the laminating of the sheet of two or more sheets, and at least one of them should just be Sheet A. When consisting of two-layer, it may consist of sheets other than Sheet A and Sheet A, two-layer may consist of sheets A, or any are sufficient. The

structure which carried out the laminating of the sheets other than Sheet A to the both sides of Sheet A when consisting of three or more layers, The structure which carried out the two or more sheet laminating of the sheet A, and carried out the laminating of the sheets other than Sheet A to the both sides, Although any are sufficient as the multilayer structure which carried out the laminating of the sheets other than Sheet A and Sheet A by turns, the structure where all layers consist of a sheet A, etc., it is desirable that the rate of Sheet A accounts for 50% or more of rate by thickness at least to the whole multilayer polyester sheet of this invention.

[0021] Although especially the thickness of each class which constitutes the multilayer polyester sheet of this invention is not limited, by 100 micrometers - 700 micrometers of **** other than about 50 micrometers - 100 micrometers of surface layers, and a surface layer, and the whole, the thickness of 600 micrometers - 900 micrometers likes 150 micrometers - 2000 micrometers on the whole preferably, and it is used.

[0022] Although especially the manufacture approach of the card which consists of a multilayer polyester sheet of this invention is not limited, the method of cutting the multilayer polyester sheet of this invention in specific magnitude, and processing it into a card is mentioned. Moreover, fabricating, such as press forming, may be performed to the above-mentioned sheet, and you may process it in the shape of a card type.

[0023] Although especially the magnitude of the card which consists of a multilayer polyester sheet of this invention is not limited, the thing of a rectangle configuration with the breadth whose long side is 10mm - 300mm and whose shorter side is 10mm - 200mm is desirable, and the thing of a rectangle configuration with the breadth whose long side is especially 50mm - 100mm and whose shorter side is 25mm - 80mm is desirable. The thing of the rectangle configuration whose long side is about 85mm and whose shorter side is about 54mm especially is more desirable.

[0024] The cards which consist of a multilayer polyester sheet of this invention are JIS, such as a magnetic card and an IC card. When used for the card of X6301 conformity, to a total of 100 weight sections of the thermoplastics constituent which constitutes the multilayer polyester sheet of this invention if needed, titanium oxide 2 - 25 weight sections are added, and it is used, making it opaque.

[0025] In addition, each class of the multilayer polyester sheet of this invention can also be made to contain other additives of various kinds of further in the range which does not spoil the object of this invention. As an additive besides these, for example A glass fiber, a carbon fiber, an asbestos fiber, Rock wool, a calcium carbonate, silica sand, a bentonite, a kaolin, talc, Reinforcement, such as clay, a WARASUTE night, a barium sulfate, a glass bead, a mica, and titanium oxide, A filler or antioxidants (the Lynn system, sulfur system, etc.), an ultraviolet ray absorbent, Thermostabilizers (hindered phenol system etc.), lubricant, a release agent, an antistatic agent, the coloring agent containing an antiblocking agent, a color, and a pigment, and a flame retarder (a halogen system --) Fire-resistant assistants (the antimony compound represented by the antimony trioxide, a zirconium dioxide, molybdenum oxide, etc.), such as the Lynn system, a foaming agent, cross linking agents (for example, the epoxy compound of many **, an isocyanate compound, an acid anhydride, etc.), etc. are mentioned. Moreover, other synthetic resin (for example, polyamide resin, polystyrene resin, acrylic resin, polyethylene resin, ethylene / vinyl acetate copolymer, phenoxy resin, an epoxy resin, silicone resin, etc.) can also be made to contain.

[0026] Since the multilayer polyester sheet of this invention can carry out thermal melting arrival at the practical temperature of about 110-150 degrees C, it is easily processible into a card, and since it excels also in thermal resistance further, even if it leaves it all over a location which becomes an elevated temperature, for example, the automobile of midsummer, it does not almost have deformation. A card application, the card which can generally record the information on a magnetic card, an IC card, etc., and a concrete target can read the multilayer polyester sheet of this invention magnetically, electrically, or optically, and/or it can be written, and can be preferably used for a possible card application and a concrete target at cards, such as a prepaid card, a credit card, a banking card, various cards for certification, and a card for driver's licenses.
[0027]
[Example] Hereafter, an example is given and the effectiveness of this invention is explained further.
[0028] It is polyester which consists of an example 1 terephthalic-acid unit, ethylene glycol unit and 1, and 4-cyclohexane dimethanol unit. And mole-ratio (I)/(II) of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) After carrying out the dryblend of the polyester (Eastman chemical company "Easter" GN071) and the aromatic series polycarbonate (Mitsubishi Gas Chemical Co., Inc. "the you pyrone" S3000) which are 70/30 to a table 1 using V blender by the presentation ratio of a publication, The biaxial screw extruder set as 270 degrees C was melting-kneaded, and was used and pelletized, and the resin constituent was obtained. Moreover, press forming of the constituent was carried out by the working temperature of 230 degrees C, and pressure 1MPa, and the thickness of 100 micrometers and a 600-micrometer sheet were fabricated.
[0029] The press-forming machine was presented with the sheet (100 micrometers and the above-mentioned 600 micrometers), and the adhesive property was investigated, after holding for 10 minutes and carrying out thermal melting arrival by the temperature of 120 degrees C, and pressure 1MPa. What cannot remove by x and the hand what has possible removing by hand was shown in a table 1 by O.
[0030] Moreover, the above-mentioned sheet was dyed by ruthenium tetroxide, the distributed gestalt of the flake sample was observed with the transmission electron microscope, and the result was shown in a table 1.
[0031] It is polyester which consists of an example of comparison 1 terephthalic-acid unit, ethylene glycol unit and 1, and 4-cyclohexane dimethanol unit. And mole-ratio (I)/(II) of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) Except having transposed the polyester (Eastman chemical company "Easter" GN071) which is 70/30 to Pori (1, 4-cyclohexane-dimethanol-terephthalate-KO-isophthalate) (Eastman chemical company "Easter" 6761) The sheet was fabricated like the example 1 and the adhesive property was investigated on the same conditions as an example 1.
[0032] Moreover, the distributed gestalt of the above-mentioned sheet was observed like the example 1, and the distributed gestalt was shown in a table 1.
[0033] The press-forming machine was presented with the hard Pori chlorination vinyl sheet (Takiron ESS8800A) with an example of comparison 2 thickness of 1mm, it was processed into the thickness of 100 micrometers, and a 600-micrometer sheet by the temperature of 230 degrees C, and pressure 1MPa, and the adhesive property was investigated on the same conditions as an example 1. The sheet of the example 2 of a

comparison was not welded, but exfoliated.
[0034]
[A table 1]

[0035] The sheet was fabricated by the presentation ratio of a publication like the example 1 and the example 1 of a comparison to example 2 and example of comparison 3 table 2, thermal melting arrival between sheets of the same kind was performed by the temperature of 130 degrees C, and pressure 1MPa, and the adhesive property was investigated.
[0036] Moreover, the distributed gestalt of the above-mentioned sheet was observed like the example 1.
[0037]
[A table 2]

[0038] The sheet was fabricated by the presentation ratio of a publication like the example 1 and the example 1 of a comparison to example 3 and example of comparison 4 table 3, thermal melting arrival between sheets of the same kind was performed by the temperature of 145 degrees C, and pressure 1MPa, and the adhesive property was investigated.
[0039] Moreover, the distributed gestalt of the above-mentioned sheet was observed like the example 1.
[0040]
[A table 3]

[0041] The sheet with a thickness of 600 micrometers was fabricated by the presentation ratio of a publication like the example 1 and the example 1 of a comparison to example 4 and example of comparison 5 table 1. It is polyester which serves as a sheet with a thickness [this] of 600 micrometers from terephthalic-acid unit, ethylene glycol unit and 1, and 4-cyclohexane dimethanol unit. And mole-ratio (I)/(II) of an ethylene glycol unit

(I) and 1 and 4-cyclohexane dimethanol unit (II) The press-forming machine was presented with the sheet with a thickness of 100 micrometers it is thin from the polyester (Eastman chemical company "Easter" GN071) which is 70/30, and after holding for 10 minutes and carrying out thermal melting arrival by the temperature of 110 degrees C, and pressure 1MPa, the adhesive property was investigated like the example 1. The multilayer-in (O) in which multilayer sheet using sheet of presentation ratio of example 1 did not exfoliate sheet using the sheet of the presentation ratio of the example 1 of a comparison exfoliated (x).

[0042] The sheet with a thickness of 600 micrometers was fabricated by the presentation ratio of a publication like the example 1 and the example 1 of a comparison to example 5 and example of comparison 6 table 2. It is polyester which serves as a sheet with a thickness [this] of 600 micrometers from terephthalic-acid unit, ethylene glycol unit and 1, and 4-cyclohexane dimethanol unit. And mole-ratio (I)/(II) of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) The press-forming machine was presented with the sheet with a thickness of 100 micrometers it is thin from the polyester (Eastman chemical company "Easter" GN071) which is 70/30, and after holding for 10 minutes and carrying out thermal melting arrival by the temperature of 120 degrees C, and pressure 1MPa, the adhesive property was investigated like the example 1. The multilayer-in (O) in which multilayer sheet using sheet of presentation ratio of example 2 did not exfoliate sheet using the sheet of the presentation ratio of the example 3 of a comparison exfoliated (x).

[0043] The sheet with a thickness of 600 micrometers was fabricated by the presentation ratio of a publication like the example 1 and the example 1 of a comparison to example 6 and example of comparison 7 table 3. It is polyester which serves as a sheet with a thickness [this] of 600 micrometers from terephthalic-acid unit, ethylene glycol unit and 1, and 4-cyclohexane dimethanol unit. And mole-ratio (I)/(II) of an ethylene glycol unit (I) and 1 and 4-cyclohexane dimethanol unit (II) The press-forming machine was presented with the sheet with a thickness of 100 micrometers it is thin from the polyester (Eastman chemical company "Easter" GN071) which is 70/30, and after holding for 10 minutes and carrying out thermal melting arrival by the temperature of 135 degrees C, and pressure 1MPa, the adhesive property was investigated like the example 1. The multilayer-in (O) in which multilayer sheet using sheet of presentation ratio of example 2 did not exfoliate sheet using the sheet of the presentation ratio of the example 3 of a comparison exfoliated (x).

[0044] The sheet (100 micrometers and 600 micrometers) was fabricated by the presentation ratio of a publication like the example 1 to example 7 table 4, and the multilayer polyester sheet (100 micrometers / 600 micrometers / 100 micrometers ("/" expresses a laminating)) was produced by the temperature of 120 degrees C, and pressure 1MPa. This multilayer polyester sheet was cut down in the 85mmx54mm rectangle which is the size which is equal to various cards mostly, and the heat sag trial estimated thermal resistance. Level support of the one end 20mmx54mm was specifically carried out in hot blast oven with a temperature of 105 degrees C, and the distance (vertical distance) in which the test piece head after 20-minute progress hung down was measured.

[0045] The sheet (100 micrometers and 600 micrometers) was fabricated by the presentation ratio of a publication like the example 1 to example of comparison 8 table 4, and the multilayer polyester sheet (100 micrometers / 600 micrometers / 100 micrometers

("/" expresses a laminating)) was produced by the temperature of 170 degrees C, and pressure 1MPa. It was able to weld at this temperature. Like the example 7, this multilayer polyester sheet was cut down in the 85mmx54mm rectangle, and the heat sag trial estimated thermal resistance.
[0046] Press forming of the example of comparison 9 rigid polyvinyl chloride was carried out like the example 2 of a comparison, the thickness of 100 micrometers and a 600-micrometer sheet were fabricated, and the multilayer polyester sheet (100 micrometers / 600 micrometers / 100 micrometers ("/" expresses a laminating)) was produced by the temperature of 150 degrees C, and pressure 1MPa. It was able to weld at this temperature. Like the example 7, this multilayer polyester sheet was cut down in the 85mmx54mm rectangle, and the heat sag trial estimated thermal resistance.
[0047]
[A table 4]

[0048] The sheet (100 micrometers and 600 micrometers) was fabricated by the presentation ratio of a publication like the example 1 to example 8 table 5, and the multilayer polyester sheet (100 micrometers / 600 micrometers / 100 micrometers ("/" expresses a laminating)) was produced by the temperature of 130 degrees C, and pressure 1MPa. Like the example 7, this multilayer polyester sheet was cut down in the 85mmx54mm rectangle, and the heat sag trial estimated thermal resistance.
[0049] The sheet (100 micrometers and 600 micrometers) was fabricated by the presentation ratio of a publication like the example 1 to example of comparison 10 table 5, and the multilayer polyester sheet (100 micrometers / 600 micrometers / 100 micrometers ("/" expresses a laminating)) was produced by the temperature of 180 degrees C, and pressure 1MPa. It was able to weld at this temperature. Like the example 7, this multilayer polyester sheet was cut down in the 85mmx54mm rectangle, and the heat sag trial estimated thermal resistance.
[0050]
[A table 5]

[0051] The sheet (100 micrometers and 600 micrometers) was fabricated by the presentation ratio of a publication like the example 1 to example 9 table 6, and the multilayer polyester sheet (100 micrometers / 600 micrometers / 100 micrometers ("/" expresses a laminating)) was produced by the temperature of 145 degrees C, and pressure 1MPa. This multilayer polyester sheet was cut down in the 85mmx54mm rectangle, level support of the one end 20mmx54mm was carried out in hot blast oven with a temperature

of 130 degrees C, and the distance (vertical distance) in which the test piece head after 20-minute progress hung down was measured.
[0052] The sheet (100 micrometers and 600 micrometers) was fabricated by the presentation ratio of a publication like the example 1 to example of comparison 11 table 6, and the multilayer polyester sheet (100 micrometers / 600 micrometers / 100 micrometers ("/" expresses a laminating)) was produced by the temperature of 200 degrees C, and pressure 1MPa. It was able to weld at this temperature. Like the example 9, this multilayer polyester sheet was cut down in the 85mmx54mm rectangle, and the heat sag trial estimated thermal resistance.
[0053]
[A table 6]

[0054]
[Effect of the Invention] Since the multilayer polyester sheet of this invention can carry out thermal melting arrival at the practical temperature of about 110-150 degrees C, it is easily processible into a card, and since it excels also in thermal resistance further, it can be preferably used for a prepaid card, a credit card, a banking card, the various cards for certification, the card for driver's licenses, etc. at card applications, such as a magnetic card and an IC card, and a concrete target.

[Translation done.]